

# Update on photon analysis

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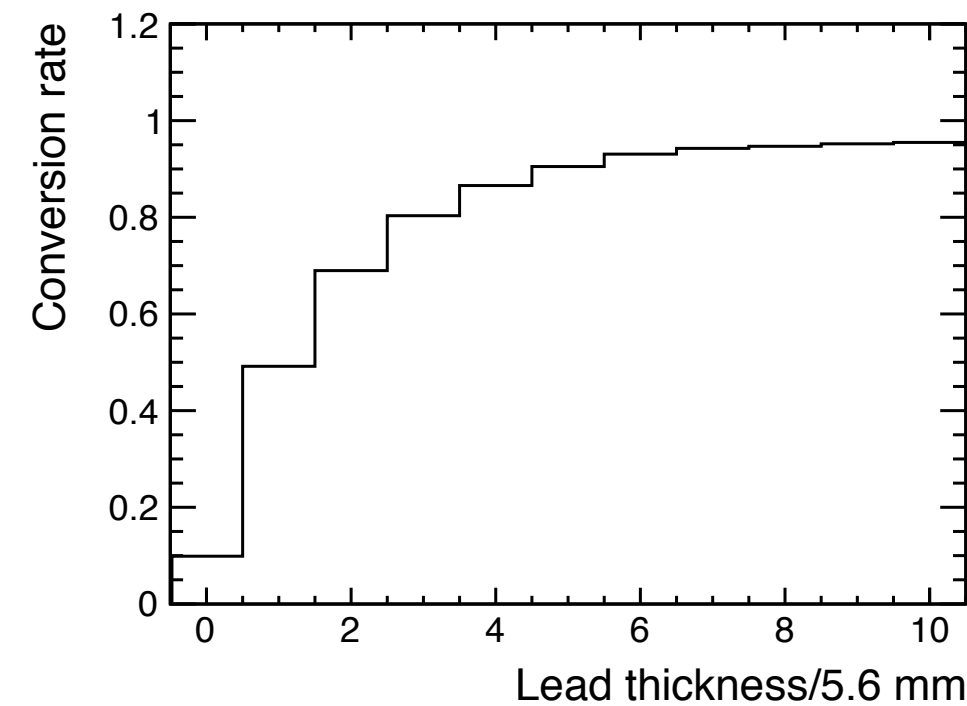
2021.01.21

# Conversion rate

Photon gun: energy 0.05-0.15 GeV  
theta 6-20 mrad  
10k events

Pre-shower consists of a lead layer and a silicon layer

Conversion rate with different lead thickness:

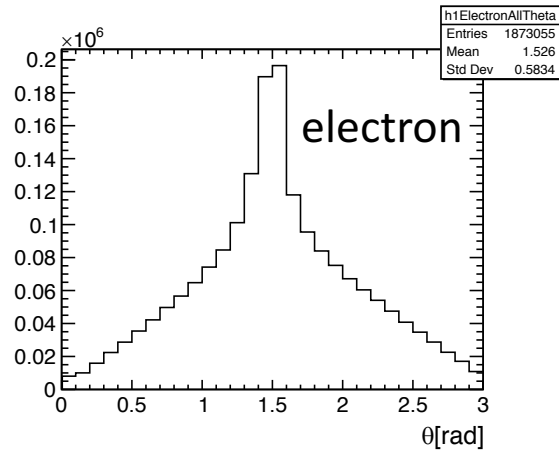


the radiation length is 5.6mm

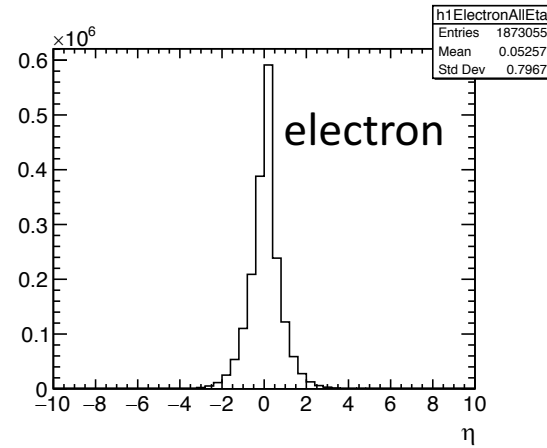
Lead thickness /5.6mm	Conversion rate
0	9.88%
1	49.17%
2	68.97%
3	80.33%
4	86.57%
5	90.5%
6	93.07%
7	94.26%
8	94.69%
9	95.2%
10	95.49%

# $\theta$ and $\eta$ distributions (1 radiation length)

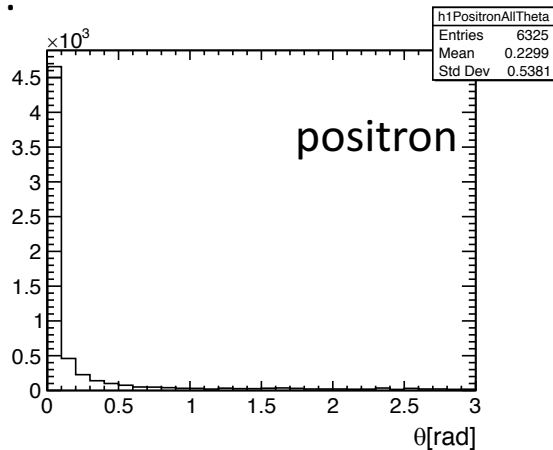
The theta distribution for all the electrons generated from shower cascade:



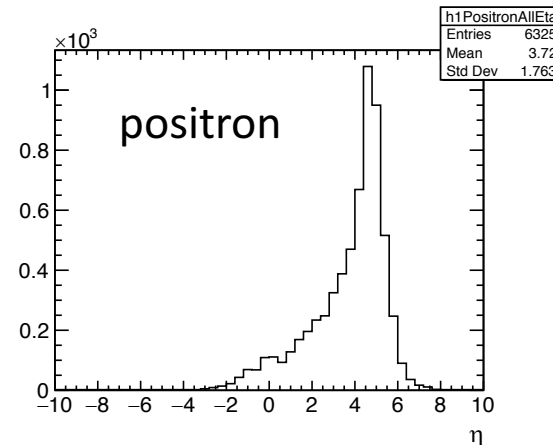
The  $\eta$  distribution for all the electrons generated from shower cascade:



The theta distribution for all the positrons generated from shower cascade :

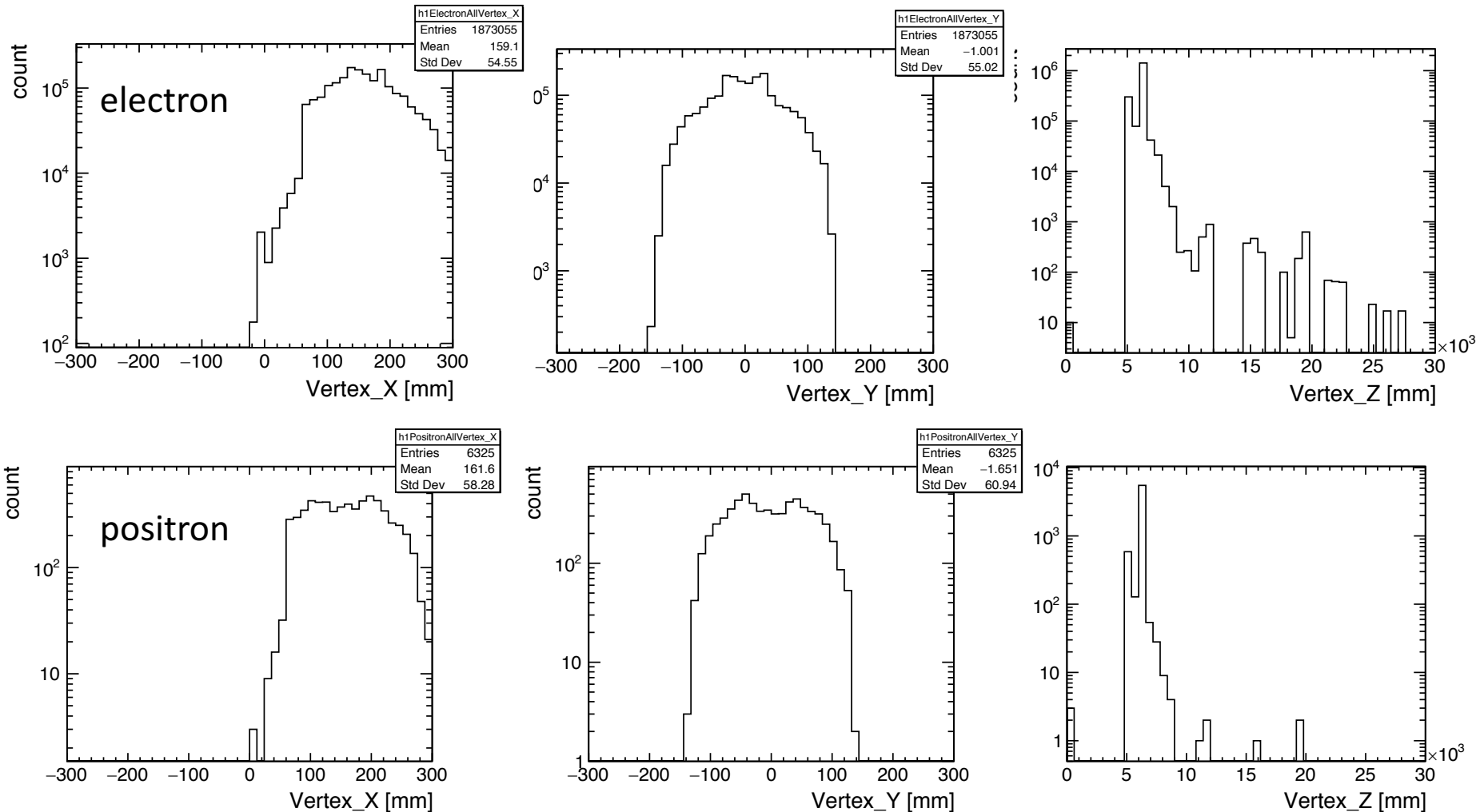


The  $\eta$  distribution for all the positrons generated from shower cascade :



# Vertex (1 radiation length)

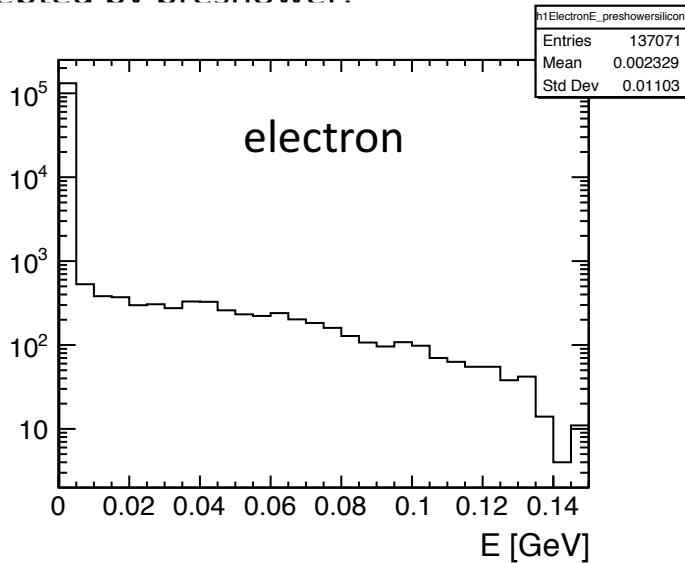
The vertex distribution for all the electrons and positrons generated from shower cascade:



These vertex are calculated in the GEANT global coordinate. Same system used to place the magnets and detectors.

# Energy (1 radiation length )

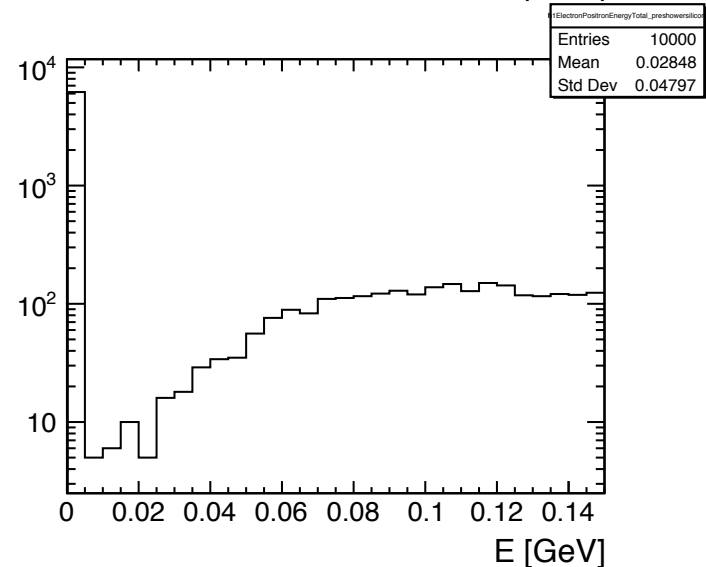
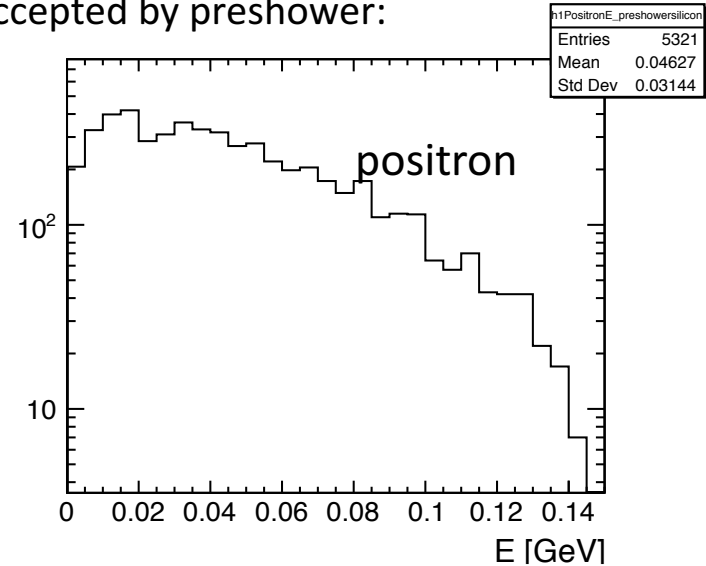
The energy distribution for the **electrons** accepted by preshower:



energy distribution is asymmetric

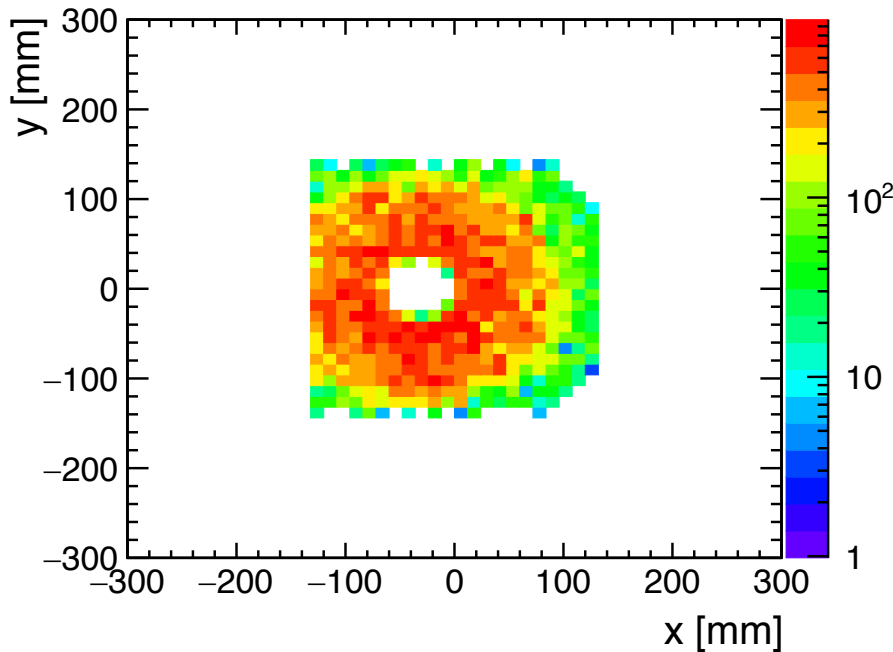
The distribution of the energy sum of  $e^-$  and  $e^+$  accepted by preshower:

The energy distribution for the **positrons** accepted by preshower:



# Position in preshower\_silicon

The position of  $e^- e^+$  in preshower\_silicon layer:

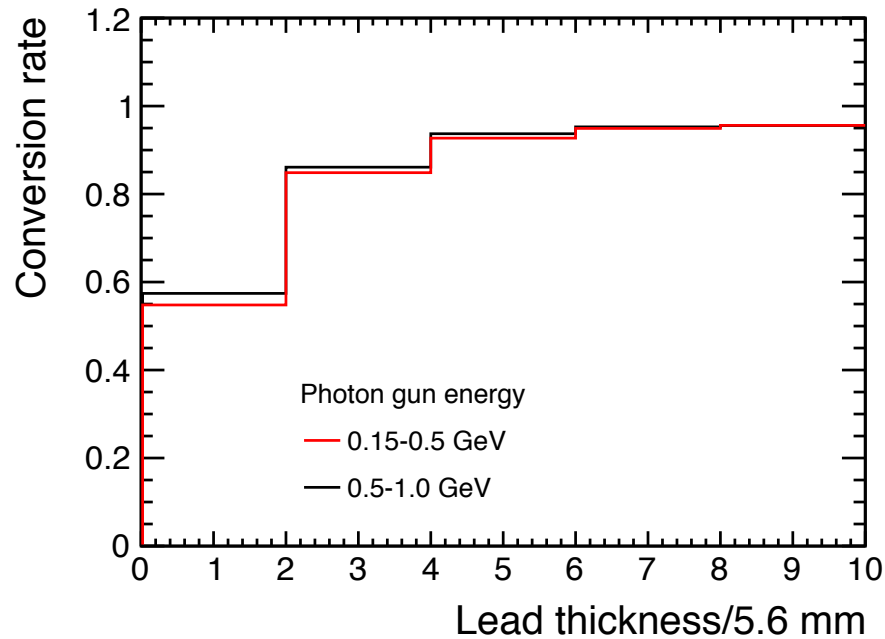


There is a hole is defined in the pre-shower silicon layer, the hole in the middle is for the hadron beam line. The distribution limited at -x is because the width of the silicon layer is 260mm. The inner radius of B0PF is 200mm, we set the width of the pre-shower silicon layer same as the B0 4 silicon trackers.

# Conversion rate

Photon gun: theta 6-20mrad

10k events

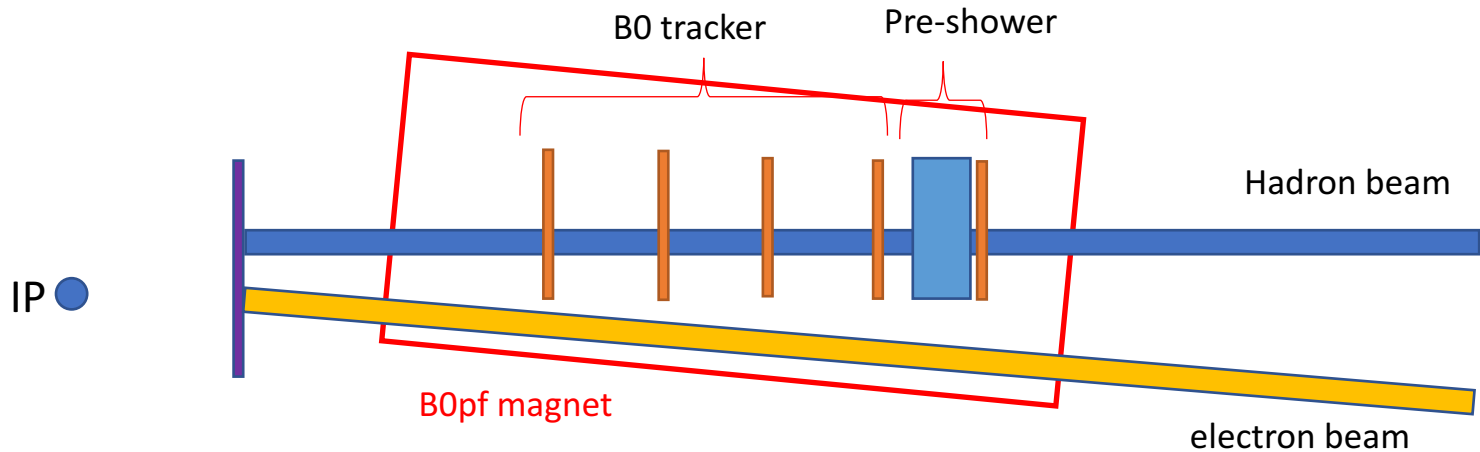


Lead thickness /5.6mm	Conversion rate	
	0.15-0.5 GeV	0.5-1 GeV
0	11.24%	11.27%
1	54.79%	57.42%
3	84.86%	86.11%
5	92.71%	93.71%
7	94.92%	95.27%
9	95.61%	95.57%

Backup



# Pre-shower



- ❑ Before installing pre-shower, the four silicon layers are evenly distributed in the magnet, occupying almost the entire space of the magnet.
- ❑ Shorten the space between the 4 silicon layers (B0 tracker), to make room for the pre-shower.
- ❑ Pre-shower consists of a lead layer (thickness is 6mm, the radiation length is 5.6mm ) and a silicon layer (thickness is 0.3 mm), the space between these two layers is ~2mm.